00369

# M.Phil/Ph.D. IN CHEMISTRY (MPHILCHEM/PHDCHEM)

### Term-End Examination

### December, 2018

### RCHE-003 : ADVANCES IN PHYSICAL CHEMISTRY

*Time : 3 hours*     *Maximum Marks : 100*

**Note :** *Answer all the questions.*

1.  (a)  Describe the electron transport systems used in photosynthesis.  **10**

    (b)  With the help of a suitable diagram, explain the process of growth of nanoparticles. In this context, explain Ostwald ripening.  **10**

2.  (a)  Give the applications of nanotechnology in the field of cosmetic industry and domestic appliances.  **10**

    (b)  Nitrogen pentoxide reacts with nitric oxide in the gas phase according to the stoichiometric equation :  **10**

    $N_2O_5 + NO \rightleftharpoons 3NO_2$.

    The following mechanism has been proposed

    $N_2O_5 \rightarrow NO_2 + NO_3$

    $NO_2 + NO_3 \rightarrow N_2O_5$

    $NO + NO_3 \rightarrow 2NO_2$

    Using the steady-state approximation derive an equation for the rate of consumption of $N_2O1_5$.

3.  (a)  What is order of a reaction ? Is it the same **10** as molecularity ? Justify your answer with suitable examples.

    (b)  Elaborate on the thermodynamic **10** information that can be obtained from the partition function.

4.  (a)  Briefly discuss the electrical double layer of **10** colloids.

    (b)  Write a short note on micelles. **10**

5.  (a)  What is constant current coulometry ? **10** Briefly discuss the applications of coulometric titrations.

    (b)  Define the components of a simple **10** polarograph. Also give the applications of cyclic voltammetry.

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